

# THE PAPER

FOR OWNERS OF THE COMMODORE PET™ PERSONAL COMPUTER

VOLUME III, ISSUE 1

AN ARESCO PUBLICATION

FEBRUARY 1980, \$2.00

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THE PAPER is published ten times per year by ARESCO, Inc., at 6303 Golden Hook, Columbia, MD, 21044. Telephone (301) 730-5186.

THE PAPER is mailed to subscribers during the last week of each month except June and December. Single copy price is \$2 and subscription price is \$15 for all ten issues of the current volume. Subscriptions do not carry over from one volume to the next. Subscribers who do not wish to order the full volume should send \$2 for each issue desired. Renewals are accepted during the last two months of the current volume year, and the first issue of each volume is published in Feb. Subscription orders should be mailed to P O Box 1142, Columbia MD, 21044 in order to assure prompt processing.

Second class postage paid in Columbia MD 21045 (USPS 450-930). POSTMASTER Send all address changes to THE PAPER, Box 1142, Columbia MD 21044

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### SOFTWARE

Software written for and distributed by THE PAPER is intended for use on the 8K PET, and we do not make any claims that said software is appropriate for use on any other Commodore computer system.

Terry - I like the PAPER...and I love the PET! I've had my 8K unit about a year and a half, and just bought the 32K version. I also bought both printers and the 2040 drive. I'd like to see a more comprehensive BASIC in CP/M, including PRINT USING, auto repeat, and all the features incorporated into the Tool Kit. I'd also like to see a much larger storage device, like rigid disks or laser video disks. Would you know of anything available? I just received the MTU four-part music board and the Mimic Digital sound board, but haven't got them wired up yet. I'll keep you posted if you're interested. Last, but not least, I'll be holding a BASIC course through the local college in late Jan, '80. Any advice?

- B Vince Haluschak

Vince - I don't know of any mass storage devices such as the ones you describe - or of any work being done bringing up CP/M for the PET. I'm sure readers will be interested in your music and sound board reports, so be sure and let us know how things work out. As for your BASIC classes, I can only suggest that you avoid trying to teach beginners the innards of a computer; that you move very quickly past the Dartmouth level commands, and that you give your students a thorough foundation in designing programs. Most people "brute-force" their way through a program, which lends itself very well to lots of bugs! Good luck - and let us know how it goes. - Terry

Terry - I have the Programmer's Toolkit, which is fantastic for the editing of large or poorly documented programs. - David Gibson

Dave - Reports like this help other readers decide what to buy! Your letter is representative of hundreds we have received in praise of the Toolkit. Thanks for writing, all of you! - Terry

Terry - I am a serious user of the 32K PET, dual floppy, and a tractor feed printer. I'm using it in my accounting business, servicing many clients. I'm enclosing a sample set of reports generated from my system. The program was written by CMS Software, 5115 Menefee Drive, Dallas, TX 75227. The program was re-written from the general ledger manual written by Osborned for the Wang. It's designed to be used by any small business, CPAs, and accountants. CMS Software has also completed an AR/AP, and Payroll program (3 programs) designed for small businesses. I'm satisfied with my purchases from CMS! Also, a word of praise for Computer Nook in Pine Brook NJ. I had problems with my PET, and they promptly fixed it; I've had no trouble since. In fact, I've enjoyed near perfect operation of both the equipment and the software! I thought you should know how pleased I am with all this, and that perhaps you'd pass the information along to others. - Paul Zervas

Paul - Thank you for telling all of us. Knowing that there's another reputable vendor of good software will be of value to all PET owners! And kudos to Computer Nook! - Terry

Terry - I think your very fine magazine should be for beginners! I, for one, need help with machine programming on the PET. How does one load, run, and use a machine language program? Your November '79 issue had a number of short ML programs, but nary a hint on how to use them. Using the ML tape provided by Commodore on the back of the Squiggle tape, how to I use these programs? (EXACTLY, KEYSTROKE BY KEYSTROKE!!) Maybe this is a problem to others, too. If this information is in print somewhere, please let me know where. And you might enlarge the explanation to include the BASIC programs loaded with DATA statements!

I like to see programs with line-by-line explanations for any "odd" routines. Also, please do not publish incorrect programs and listings. It is most annoying for us dummies to have to wait for the corrections in the next issue to find out what is going on. For example, line 40, page 7 should be POKE 32768+i,i. Even I know that. I think you should have caught this. (Name withheld on request)

NWOR - Commodore dealers should have copies of two books that can provide you with the info you need on machine language programming. The first one is the PET User Manual (and the information you want begins on page 91). The second is called simply 6502 Programming Manual, and gives you all the instruction codes and their mnemonics (as well as a lot of other good stuff). In BASIC, the PEEK command looks at specific memory locations, and the POKE command puts data into those locations. Frequently the programmer stores that data in DATA statements, then uses FOR/NEXT loops to read the data from the DATA statement and POKE it into memory. As for my errors, I have to admit you're right. I should have caught it, and I apologize. - Terry

Terry - Does anyone manufacture a dual D/A converter which would plug into the IEEE port as well as the user port and 2nd cassette interface (for power)? It could be used to draw on a storage oscilloscope or to make stereo music. Arnie Lee wrote a short note about clocks and timers. Is there some way to use the microsecond timer plus the jiffy clock to accurately measure a fairly long time interval? For example, every 1/60 second could one reset the microsecond timer in such a way as to compensate for any delays in the instruction for resetting? - Stan Klein

Stan -Connecticut Microcomputers (203) 775-9659 might have the A/D converters you're looking for. They can be reached at 150 Pocono Road, Brookfield CT 06804. I don't know enough about the timers to answer your second question, so perhaps one of our readers will be able to help. - Terry

Terry - Can you set aside one hour a day to answer questions?  
- Tom Lamb

Tom - Sure. But I don't have much in the way of answers. We have the old 8K PET, with the old 011 ROM set; no printer or disk drive. But I'll be glad to help if I can, and you can reach me at (301) 730-5186. - Terry



## PET USERS

Glenn Schwartz  
807 Avon  
Philadelphia, PA 19116

John Loofbourrow  
ACGNJ  
(201) 233-7068

United PET Users  
1929 Northport Dr. No. 6  
Madison, WI 53704

Twin Cities PET Users  
(John Fung)  
(612) 376-5465

John Jones  
2134 NE 45th Avenue  
Portland, OR 97213

Sacramento PET Workshop  
P.O. Box 28314  
Sacramento, CA

Midpeninsula PUG  
Ford Aerospace Cafeteria  
3939 Fabian Way  
Palo Alto, CA  
(415)328-7745 (Harry Saal)

BAMUG  
1450 53rd Street  
Emeryville, CA

David Smith - NOCCC  
3030 Topaz No. A  
Fullerton, CA 92631

NW PET USER'S GROUP  
John F. Jones  
2134 NE 45th. Avenue  
Portland, OR 97213

Southeast Connecticut  
Pet User Club  
% Paul W. Sparks\*  
13 Lincoln Dr.  
Gales Ferry, Ct. 06335  
203-464-6266

South Florida PUG  
Dave Young  
7170 SW 11th St.  
W. Hollywood, FL 33023  
(305) 987-6982

PET User Group  
c/o MICH (Michigan Computer Hackers)  
2235 Lakeshore Drive  
Muskegon MI 49441

St. Louis PET Users  
(Mary Perkinson)  
(314) 432-5225

Northern VA PET Users  
2054 Eakins Ct.  
Reston, VA 22091

Shelly Wernikoff  
2731 N. Milwaukee Ave.  
Chicago, IL 60647

SPHINX  
(415) 451-6364

Vancouver PET User Group  
Box 35353, Station E  
Vancouver, BC, Canada

Lincoln Computer Club  
750 E. Yosemite  
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Communications Engineering  
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San Diego PUG  
c/o D Costarakis  
3562 Union St.  
San Diego, CA 92103  
(714) 235-7626 (7 am - 4 pm)

Independent PET Group  
22 Firs Walk, Tewin Wood  
Welsyn, Herts., UK

PET Users Group  
2001 Bryan Tower Suite 3800  
Dallas, TX 75201

Capital District PET Users  
(Ben Green)  
(518) 370-1820

PET Users of Japan  
Soichiro Moridaira  
Shinsen Park Himu, Rm. 150  
4-13 Shensencho  
Shibuyaku, Tokyo, Japan 150

David Liem  
14361 Warwick Street  
Detroit, MI 48223

Larry Williams  
P.O. Box 652  
San Antonio, TX 78293

Richard Prestien  
6278 SW 14th Street  
Miami, FL 33144

Long Island PET Society  
Ralph Bressler  
Harborfields HS  
Taylor Ave.  
Greenlawn, NY 11740

Utah Pug  
Jack Fleck  
2236 Washington Blvd.  
Ogden, UT 84401

PET User Group  
Doug Hennig  
16 Everett Cres.  
Regina, Sask. Canada  
S4S 2M7

Gene Planchak  
4820 Anne Lane  
Sharpsville, PA 15150  
(412) 962-9682

SEWPUG  
Theodore J. Polczynski  
P.O. Box 21851  
Milwaukee, WI 53221  
(414) 282-4181

Doug Hennig

```

10 PRINT "/C/":TI$="000000":REM SETS CLOCK TO ZERO
20 FOR I=1 TO 800: PRINT"A";:NEXT:REM FILLS SCREEN WITH 800 As
30 Z=TI:REM SETS Z TO TIME IN JIFFIES
40 FOR I=1 TO 500:NEXT:REM WAITS BEFORE STARTING AGAIN
50 POKE 59458,62: REM SETS "FAST MODE"
60 PRINT"/C/"TI$="000000"
70 FOR I=1 TO 800:PRINT"A";:NEXT
80 Z1=TI:PRINT"/C/";Z;Z1:REM SHOWS TIMINGS
90 POKE 59458,30:REM SETS TO NORMAL

```

65 POKE 59409,52  
75 POKE 59409,60

I don't know how or why this works. Anyone care to offer an explanation? Also, I never checked to see if this affects use of the cassette or any other I/O functions, such as is noted when using CB-2 sound.

[illegible]

Marjorie McKensie

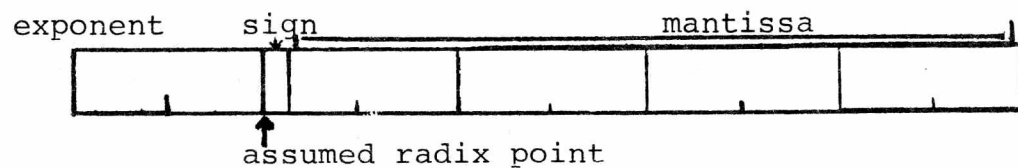
PIMS works using floppy instead of cassette. Don't think it was too hard - will send live changes if anyone wishes. Maybe they'll send an interesting routine in return! Also, about a month ago, wrote Textcast asking if their program works with floppy & printer. So far, no response.

## FLOATING POINT NUMBERS

Reprinted by courtesy of ABACUS Software. By Arnie Lee

Floating point variables may assume fractional as well as integer values. They are useful because they may take on values with a very wide range. Floating point variables are specified by default. If they are not integer('%') nor string('\$') then the variable is assumed to be of the floating point type. Each floating point number occupies five memory locations inside the PET whether it be a single element or an array.

The format of a floating point number is as follows:



The exponent occupies one memory location. The exponent is a power of two but is stored in excess 128 notation. This means that 128 has been added to the true exponent to allow for the easier handling of negative exponents. Thus if the exponent of a number is 16, then you would add 128 yielding 144 = X'90'. This last value, X'90' would be stored as the floating point exponent. Similarly if the exponent of a number is -12, then you would add 128 yielding 116 = X'74' which you would store as the floating point exponent.

The mantissa is the fractional part of the floating point number. It is always normalized. This means that the fraction has been adjusted and the exponent likewise adjusted until the most significant binary digit of the mantissa is to the right of the assumed radix point.

Since PET BASIC always normalized the mantissa, the leftmost bit of the fraction is always a one. This is redundant and so the position is used for another purpose. This bit is used as the sign bit for the number. Thus the fraction has an "assumed" most significant bit. A zero sign bit indicates a positive floating point number, while a one sign bit indicates a negative floating point number.

The example below shows how you may derive the representation for a floating point number.

PROBLEM-What is the floating point representation  
for  $1000_{10}$ ?

- 1)  $1000_{10} = 0000\ 0011\ 1110\ 1000_2 = X'03E8'$   
                     radix                                      radix
- 2) Shifting the radix point ten positions to the left in order to normalize the fraction while raising the exponent by a power of 10 gives us  
                     .1111 1010 0000 0000 \*  $2^{10}$
- 3) The number is positive, so we can set the sign bit to zero:  
                     .0111 1010 0000 0000 \*  $2^{10}$
- 4) The exponent is ten, but in excess 128 notation, the exponent is  $10+128 = 138 = 100\ 1010_2$
- 5) Combining the exponent and mantissa, we find that the resultant appears as follows:  
                     1000 1010 0111 1010 0000 0000 0000 0000 0000 0000<sub>2</sub>  
                     which, in hexadecimal form is 8A 7A 00 00 00.
- 6) A negative value would have a sign bit of one. Thus  $-1000_{10}$  would be represented as  
                     1000 1010 1111 1010 0000 0000 0000 0000 0000 0000<sub>2</sub>  
                     or 8A FA 00 00 00 in hexadecimal.

Of course, PET BASIC carries the precision further than the examples above have shown, but the method is the same. As stated at the beginning, floating point variables may take on an extremely wide range of values. By experimenting with BASIC, I have found that the range for the PET is:

PRINT 2↑126.99999995	to	PRINT 2↑-127
1.70141174 E+38		5.87747176 E-39

## FLOATING POINT ARITHMETIC

The following descriptions are the fundamental arithmetic operations that PET BASIC performs on its floating point variables. The descriptions will allow you to use these routines from a machine language program.

ADDITION                      FACC = FACC + AFAC

- 1 Place the first operand in the floating point accumulator.
- 2 Insure that the format of the number in the FACC is non-true binary. The most significant bit of \$B1 must be off if the number is positive, or on if the number is negative. The sign bit of \$B5 must be off if the number is positive and on if the number is negative.
- 3 Place the second operand in the alternate floating point accumulator.
- 4 Insure that the format of the number in the AFAC is non-true binary. The most significant bit of \$B9 and the sign

bit of \$BD must be off if the number is positive and on if the number is negative.

5 Call subroutine FPADD at \$D73F. The sum is in the FACC

SUBTRACTION FACC = AFAC - FACC

- 1 Place the subtrahend into the AFAC, the minuend into the FACC
- 2 Insure that the format of both numbers is non-true binary
- 3 Call subroutine FPSUB at \$D728. The result is in the FACC.

MULTIPLICATION FACC = AFAC \* FACC

- 1 Place the multiplicand into the AFAC, the multiplier into the FACC
- 2 Insure that the format of both numbers is non-true binary
- 3 Call subroutine FPMULT at \$D900. The result is in the FACC.

DIVISION FACC = AFAC / FACC

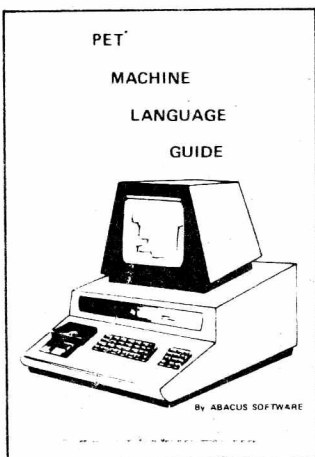
- 1 Place the dividend into the AFAC and the divisor into the FACC
- 2 Insure that the format of both numbers is non-true binary
- 3 Call subroutine FPDIV at \$D9E4. Find the quotient in the FACC.

EXPONENTIATION FACC = AFAC  $\uparrow$  FACC

- 1 Place the base into the AFAC, the exponent into the FACC.
- 2 Insure that the format of both numbers is non-true binary.
- 3 Call subroutine FPEXP at \$DE2E
- 4 Find the result in the FACC

NEXT MONTH: ARITHMETIC FUNCTIONS

## PET' MACHINE LANGUAGE GUIDE

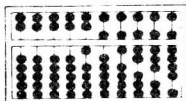


Contents include sections on:

- Input and output routines.
- Fixed point, floating point, and Ascii number conversion.
- Clocks and timers.
- Built-in arithmetic functions.
- Programming hints and suggestions.
- Many sample programs.

If you are interested in or are already into machine language programming on the PET, then this invaluable guide is for you. More than 30 of the PET's built-in routines are fully detailed so that the reader can immediately put them to good use.

Available for \$6.95 + .75 postage. Michigan residents please include 4% state sales tax. VISA and Mastercharge cards accepted - give card number and expiration date. Quantity discounts are available.



**ABACUS SOFTWARE**

P. O. Box 7211

Grand Rapids, Michigan 49510

## aidcom SOFTWARE

PO Box 165 Clarkson Postal Station  
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PRODUCT REVIEW: COMMODORE WORD PROCESSOR

(Editor's Note: Philip Restagno, of Bronx, NY sent us the following letter printed on the 2020 printer. In order to let you see the quality of the print, we have not edited Phil's letter.)

Dear Terry,

I would like to extend my subscription to your ~~great~~ paper: THE PAPER. Enclosed, please find \$15 as underpayment for your informative publication. This CBM word processor has a super-sensitive repeat key, which makes it wonderfully easy for me to backspace and correct all of the errors it causes. I have purposefully kept the accidental s's of ~~great~~. I should warn you at this point about my psychological quirk which invariably causes me to later criticize anything I have once praised; should this happen, in the course of the completion of this letter, please understand, no disparagement of your crummy magazine will be intended.

This Commodore word processor is worth \$100. One has little idea of the speed of PET until one presses OFF/RVS followed by cursor down or up key. Text zips by fast enough to send Evelyn Wood back to GO without collecting \$200. Page 27 of Issue 10 Vol 1 of The Paper (before it began to repeat issue numbers) has a fine repeat-key routine. There are many other fine features of this processor: copy, merge, move, tab, right and left margins, and lots more. I have not tried them all, but everything I have tried works well.

By now you suspect I am taking the occasion of subscription renewal a little too seriously. You can easily perceive you will die of boredom and/or exhaustion before you can make it to Yours Truly. Possibly. I have indeed wrestled with my conscience about subjecting you to this. Unfortunately, I have subscribed to The Paper, The Pet User Notes, and The Pet Gazette (now, Compute), for two years always wanting to contribute something, ANYTHING. Well, this is it, anything, and you're the unlucky one. Yours is the most voluminous of the three, and it was thru yours that I found out about the others. The User Notes has sent me nothing since Vol 2 Issue 1, a long time ago; I can at this point only logically deduce I paid for volume 2. It's a great publication too, no, really. You and Compute are up-to-date, as of now, after doubtful periods.

Is it legal for me to pass something wonderful to you from Compute (Issue 1)? Come to think of it, Jim Butterfield passed it to Compute from the "Vancouver Group". POKE 59458,62 noticeably speeds up Pet Basic of both old and new ROMs. My 32N can be restored to slow with POKE ,30. This did not prevent me from ordering the Moser 6502 Macro Assembler/Text Editor yesterday (after drooling over the ad of the Skyles MacroTeA for three days). I finally decided, since both are in ML and seem to

have the same features, to get the significantly lower priced item. At first I wanted the permanency of Skyles ROM. Then I felt disk will get the Moser in fast enough, and 32K should easily absorb its 8K.

I own the PET 32N, 2040 Floppy, and 2022 Printer. I converted from the 8K old ROM model, because I could not get the cassettes to work. This 32N has crashed from Basic a few times, but I feel it may be due to a loose plug and a lazy suzan. At least, I couldn't seem to duplicate a crash by doing anything other than jiggle my machine. The Floppy has been to California and back on what I could only diagnose as over-heating. They wrote: 6502 Bad I II III IV. It is working now for a week. Still gets mighty hot on top. When the warranty is over, I may cut holes into it. Mine only has vents on the sides. I would like to sell a Computer Mart Systems PME1 32K Memory Expansion Board which worked very nicely on my 8k PET. This lifts an 8k to a full 40k, 8 of it addressable through ML only. Fits inside the Pet. Plus it in and code. Yours Truly,

Philip Restagno  
2910 De Witt Pl  
Bronx, NY 10469

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## REVIEW: TIME TREK

by Roy Busdiecker

What characteristics should a game program have in order to be called "good"? In order to be of lasting value, it must have enough variability in the situations it presents and alternatives in actions the player can take so it doesn't get repetitious and boring. To keep interest up, there should be some excitement ... like things continuing to happen whether you do anything or not.

TIME TREK, developed by Brad Templeton and produced by Personal Software (P.O. Box 136, Cambridge, MA 02138), meets both of those requirements. Described as a "real time action game", TIME TREK is a "good guys versus bad guys" shoot-out game based on the popular (old) TV space adventure show, Star Trek.

"Real time", in this case, means that your starship moves around the screen more or less "immediately" in response to the controls you operate. If you start moving in a certain direction at a particular speed, then you'll keep going that way at that speed until you change, run out of fuel, run into a star, or get shot down by a Klingon. You can alter course, fire phasers or torpedoes, hide behind a star, speed up or slow down, or seek out a star base to refuel. The Klingons' aim is very good!

All that may sound like it fills the bill for both variety and excitement, but it's only the beginning! When the game starts, you choose a difficulty level from 1 to 9, and you receive a starting supply of energy. Everything that happens affects your energy reservoir ... moving slowly uses it up very rapidly. Getting hit by a Klingon weapon takes a big chunk out of the energy supply. Reach a star base before you run out of energy, and your "fuel tank" will be topped off.

two for or

long (esp

a while,

THE PAPER is the last of the "PET-only" publications. The User Notes and the Gazette were acquired by Compute. Even Eric Rehnke's 6502 User Notes is no longer around! (We got most of our original newsletter ideas from Eric's Notes!) They shall all be sorely missed, since they were great sources of good information.

## HIMONDIS ON A 16K PET

by Wayne Sung

HIMONDIS has proven to be extremely handy as I grew to understand the inner workings of the PET. Since mine is a 16K machine, I thought I should try to relocate the program to the 16K boundary as an exercise. This didn't prove to be difficult, and the availability of articles concerning relocation means that I really do not have to explain this change in great detail. I would like to mention some other changes I made, however.

With the availability of the new ROM set (with the built-in monitor) some of the code contained in HIMONDIS is no longer necessary. In fact, everything below \$3E00 (16K version. In the 8K version, \$1E00, and so on throughout the rest of this article) may be eliminated by some relatively simple substitutions.

LOCATION INSTRUCTION Should be changed to LOCATION INSTRUCTION

3FDE	JSR 3C13	3FDE	JSR E775
3FE8	JSR 3C22	3FE8	JSR E784
3FEB	JSR 3C4F	3FEB	JSR E7A7
3FF0	LDA 12	3FF0	LDA FC
3E00	LDA 15	3E00	LDA 14

Only these five changes are needed to make a very compact disassembler program work with the new ROM monitor. The first four changes substitute internal routines for ones previously contained in user memory. The last change compensates for the fact that the ROM monitor heading is different from the tape monitor heading by one line.

There appears to be a problem, however, when this program is used with the printer to produce printed disassembly listings. The printer works correctly with normal monitor commands, but calling the disassembler results only in several lines with a question mark at the beginning of each one - and nothing else. The reason turned out to be that the HIMONDIS normally sets up for the starting address by writing two CRs and then calling a double byte read routine to pick up the address. With the printer active, however, the carriage returns are written to the printer, not to screen memory, and winds up not formatting the read properly. Also, the fact that a BRK occurs every 21 lines isn't necessary for printing. Therefore I made more changes, so that both screen and printer listings could be accommodated. These changes include both a new body of code and a few changes to the existing code.

With these changes, the call from monitor to disassembler becomes G 3FE4,SADR,EADR. Be sure no extra spaces are added, or an error flag (?) will result.

This assumes printer output because the program will list until the EADR is equal to or exceeded during the listing. The stop key is able to terminate listing. For listing on the screen, omit the EADR. G 3FE4,SADR is sufficient. This will produce the normal full screen listing with a break at the bottom of the screen. This can still be restarted with a G only.

The printer is enabled in BASIC direct by OPEN 4,4 and CMD 4. It is deselected with PRINT#4 and CLOSE 4. The close isn't necessary until the entire program is complete. Note that even for the screen print option, if the printer is still activated, it will print and break just as the screen print would. This doesn't hurt anything except the looks of the listing.

Add the following code:

```

3DC7: STX 44      store address low returned
3DC9: LDA FC      retrieve address high returned
3DCB: STA 45      store address high
3DCD: JSR FFCF    read next byte
3DD0: CMP #0D     is it a CR
3DD2: BNE 3DD7 (03) CR assume screen listing
3DD4: JMP 3FF4
3DD7: JSR E7A7    read ending address
3DDA: STA FD      store low byte returned
3DDC: LDA FC      retrieve high byte returned
3DD5: STA FE      store high byte
3DE0: SEC
3DE1: LDA FD      subtract start (or current) address
3DE3: SBC 44      from ending address to see if
3DE5: LDA FE      program needs to proceed or exit
3DE7: SBC 45
3DE9: BCC 3DFD (12) if SA exceeds EA then exit
3DEB: JSR F301    test for stop key
3DEE: BEQ 3DFD (0D) stop key: exit
3DF0: JSR 3E12    print next line of disassembly
3DF3: JSR 3EEF    modify address locations
3DF6: STA 44      store new address low
3DF8: STY 45      store new address high
3DFA: JMP 3DE0    see if another time around is needed
3DFD: JMP FD56    exit: return to monitor
change these locations:
3FE4: JSR E7EB    read delimiter and skip
3FE7: JSR E7A7    read start address
3FEA: BCC 3FEF (03) if CR then error
3FEC: JMP 3DC7    go and store address returned
3FEF: JMP E7F7    signify error and return to monitor
3FF2: NOP
3FF3: NOP

```



Apparently then, LDA VAL followed by JSR FFD2 prints one character (whose ASCII value is VAL) either on the screen or on the printer (if the printer is active). LDA VAL followed by JSR E775 prints two characters in hex, the values of which are the topfour bits of VAL and the lower four bits of VAL. I don't yet know how to activate and deselect the printer from machine language. Can someone out there tell me? Also - does anybody out there have good success working with the disk and machine language together?

---

(Editor's note: We at ARESKO do not have the 16K PET, or a printer, so we are unable to answer Wayne's questions for him. Let us know if you have the answers he needs, and perhaps a lot of other people will learn from you, too!)

---

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# IN DEFENSE OF PIMS

by Francis Turco  
800 Follin Ln  
Vienna VA 22180

In the October issue (Vol II, Issue 8, p. 23) Dennis Costarakis offered his comments on PIMS. He made two points. First, the program will not perform if you type it exactly as supplied by Mr. Gupta in the PIMS manual. Second, the program is of little value. He recommended it "for general information to someone brand new to data base management - for general information only".

The first point although true is certainly not overwhelming. Anyone familiar with programming his PET in BASIC should have no problem resolving the error messages. Certainly, nothing approaching "major modifications to the program". Mr. Gupta did an exemplary job of documenting the program; both with a flowchart and with comments within the program. The manual is well written with several chapters devoted to instructing the operator in the use of PIMS.

With regard to the second point, I cannot disagree more. The program is certainly valuable as an "information manager". Granted, if you are accustomed to working with IBM's IMS (Information Management System), you will feel that PIMS falls short. How many PET owners use professional software on mainframe computers?

The program saves the user the task of developing the routines for doing such things as creating a file (Save, Load), editing (Add, Delete, Change), Searches, Sorts, Sums, Selective Summations, and Merging Mailing Lists. These functions are necessary for managing any sizable amount of data and PIMS provides the PET owner with a method to implement them.

In particular, the SORT routine is an efficient sort referred to as the "Shell-Metzner" sort. This sort algorithm is many times better than the standard "bubble sort" that a novice programmer would find in 95% of the text books available on BASIC.<sup>1</sup>

Our company has utilized PIMS directly on a TRS-80 in the printed circuits laboratory to maintain an inventory of chemicals and materials, and to track work orders. We have modified PIMS to operate on the PET in our department and use it to keep track of spare parts lists for Army contracts. Recognizing that the PET and PIMS are no match for IBM and IMS, I still feel that PIMS is the best program I have seen for anyone who wants to do some serious work on the PET without reinventing all the routines presented in PIMS.

---

<sup>1</sup>A comparison of Sorts, John P. Grillo, Creative Computing, Nov.-Dec. 1976, p. 7

MODIFICATIONS FOR PIMS  
by Chris Kalmbach  
Rt 3 Box 111-P  
Neosho MO 64850

Although I agree with Mr. Costarakis that as published, PIMS cannot be keyed in and run on a PET computer, the changes required are not major or difficult to make. I would hate to see anyone pass up this excellent and useful program just because they thought it wouldn't run on their PETs.

I purchased my copy of PIMS after reading an excellent review of the program (by Curtner B Akin, Jr.) in the June, 1979 issue of Kilobaud Microcomputing. In his article, Mr. Akin described necessary changes to the program. My copy of PIMS came from Scelbi with some corrections rubber-stamped at the end of the program listing. In addition to these changes, I added a few of my own, to handle some of the formatting problems. The original program line 250 uses the "PRINT USING" statement, which is not in the PET's vocabulary. I added the lines 242 through 250 in the List Of Changes to take care of this. Lines 472, 480, 482, and 484 also make formatting changes.

I have not included any of the changes that are printed in the PIMS manual on page 73.

A final note: My PET is running old ROMs. This program may require other changes to run with a new ROM set. Mr. Connely (who brought to my attention the article by Mr. Costarakis) has the new ROMs in his PET, and I'm certain we can supply information for conversion if anyone is interested.

DO	LINE #	DESCRIPTION OF CHANGE	EXPLANATION
Delete	80	Delete this line	Not used on the PET
Delete	90	Delete this line	Not used on the PET
Add	242	IF I<10 THEN 250	Takes the place of "PRINT USING" for formatting
Add	244	PRINT I;	
Add	246	GOTO 260	
Change	250	PRINT " ";I;	One space between quotes
Change	260	PRINT "█";	The backspace character
Add	472	IF I<10 THEN 484	Takes care of screen formatting
Change	480	PRINT I;"█";N\$(I)	
Add	482	GOTO 490	
Add	484	PRINT " ";I;" ":";N\$(I)	One space between first quotes on line 484
Change	990	T\$=N\$+T\$+CHR\$(126)	Corrects field display
Change	1260	GOTO 540	Lets you back into command-solicit mode
Add	1675	T1\$=" "	No space between quotes; Keeps garbage out
Add	2065	FOR Z=1 TO 5:B\$(Z)="": NEXT Z	
Change	2260	The zero in quotes should be an alphabetic O.	
Change	2370	Remove the command GOSUB	
Change	2540	GOTO 540	Returns control to command solicit even if there is no rubout
Change	2630	Add a semi-colon between the last quotation mark and N\$	
Delete	3430	Delete this line	Not used on the PET
Delete	3440	Delete this line	Not used on the PET

The rest of the necessary changes are on page 73 of the PIMS manual.

# HIMONDIS & ROM TEST REVISITED

by Wayne Sung

1. HIMONDIS: I did not have any instructions for using HIMONDIS and so I have always called the disassembler as a separate subroutine entering at 3FE4 (16k vers) In trying to redo the package for printer use, imagine my surprise to find a D command available all along. I was a little apologetic to say the least. This also showed that the 16k HIMONDIS I sent you earlier has a problem: 3DB6 should be 3E and is 1E. Considering the fact that I never used the disassembler as a D command from the Monitor, this particular problem had never been spotted before. Anyway, the adaptation for printer use will allow either one or two parameters to follow the D command. One parameter implies the same operation as always. Two parameters and the listing continues until the address specified in the second parameter has been exceeded. The call from Monitor will be .D SADR for the normal list and .D SADR,EADR for the printer list. The modified code is as follows:

```
3DA9 B0 11      BCS 3DBC          was 85 44  STA 44

3DBC 85 44      STA 44
3DBE A5 12      LDA 12          has same effect as code already present
3DC0 85 45      STA 45
3DC2 20 CF FF JSR FFCF          read delimiter
3DC5 C9 0D      CMP #0D         is it a CR?
3DC7 D0 03      BNE 3DCC        no, go receive next parameter
3DC9 4C AF 3D   JMP 3DAF        yes, start list
3DCC 20 4F 3C   JSR 3C4F        read next parameter
3DCF 85 06      STA 06          store lo byte of ending address
3DD1 A5 12      LDA 12
3DD3 85 07      STA 07          recall and store hi byte
3DD5 38         SEC
3DD6 A5 06      LDA 06
3DD8 E5 44      SBC 44
3DDA A5 07      LDA 07
3DDC E5 45      SBC 45
3DDE 90 12      BCC 3DF2        compare last line address to ending address
3DE0 20 2A F3 JSR F32A          more to be printed, but check stop key first
3DE3 F0 0D      BEQ 3DF2        if stop then terminate
3DE5 20 12 3E   JSR 3E12        print next line
```



```

3DE8 20 EF 3E JSR 3EEF      update line address
3DEB 85 44      STA 44
3DED 84 45      STY 45      store current line address
3DEF 4C D5 3D JMP 3DD5      start another cycle
3DF2 4C 57 3A JMP 3A57      finished, return to Monitor mainline

```

8k users can make the same changes by substituting 1 for 3 where underlined. I am currently trying to make my various versions of disassemblers have more compatible formats and this is one result. Note that I am ready to use a printer but I don't have one. If I did I wouldn't be hand typing program listings. Question: what are the other three commands in HIMONDIS (V, O, T)? "Expansion"?

2. ROM Test: I found a copy of a ROM test that you published some time ago. Combining both sides of the page finally produced a working version. I would like to give you the constants for the new machines. Note that I did not use the lines beyond 570: that is just a different heading and constants for the 019 ROM. Anyway, ROM TEST IN PROGRESS applies no matter what set. Note also the upgrade ROMs have different checksums (in the E block, specifically) from the large KB units.

```

For Upgrade ROMs: 540 DATA 82,69,83,83,71,241,191
                  550 DATA 99,241,121,53,163,167
                  560 DATA 253,34,148,168,90,73,0
                  570 DATA 139,18,128,0,0

```

```

For -N units      540 DATA 82,69,83,83,71,241,234
                  550 DATA 99,241,121,53,163,167
                  560 DATA 5,34,148,168,90,73,0
                  570 DATA 139,18,128,0,0

```

The 5 in line 560 does not represent a low checksum. I suspect it should be 261 which of course overflows to a 5. Within the limits of the original program this should be OK. Also note that the -N units may have 4 or 5 ROMs as delivered. This is because they are now using 32k ROMs versus the 16k ROMs used previously. The E block of course is still a 16k unit, however some units have a split F block while others have only one F ROM. I suspect the F block checksum should come out the same anyway but I stand to be corrected.

Question: what is the function of the entries from 73 through the end which are in lines 560 and 570?

3. The built in Monitor sure is nice. Those of us who have put our trust in the SAVE procedures and don't verify each save, however, are in for a treat. For some reason, the first two characters of the name string are stored in the same locations that the IRQ vector is stored (the one you see in the Monitor heading). Immediately after a save, do a R and see that IRQ no longer says E62E but rather something else depending on the name used. What does this mean? Do not pass go and do not ... that is to say, do not immediately do a .G after a save. When you do, the Monitor "restores" the machine IRQ according to what it finds in its heading. By now we all know that this is a meaningless value. Different things happen: on mine it simply goes off somewhere and sulks. On one large KB unit I tried it attempted to print another Monitor heading and gets part way done and then goes off somewhere. Remedy? Verify each save. Any exit and re-entry to the Monitor reloads the proper IRQ into the heading. Or, do R and correct it yourself. It is not possible to put the proper characters in your name string so that everything comes out OK. The E6 requires a reverse-field checkerboard and as we all know, reverse field inside quotes takes at least two positions: one to turn reverse field on and the other the character you want. Then you have to turn it back off...  
Question: why did they do that?

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## OBSERVATIONS ON VOLUME II, ISSUE 7

by Roy Busdiecker

Allan Adams letter reminded me of many days, weeks, and months that I spent feeling the same frustration that he described. Nonetheless, there is some reason for optimism.

Commodore's change of ROM's was traumatic for all of us. The defects in the original PET BASIC could have been corrected without the disruption of existing software ... but the spectacular work of Butterfield, supplemented by the cross-references from Russo and Lindsay, has given us most of the information we need to patch up our old products.

The CBM printer is now available. My model 2023 does most of what it's supposed to do, with the notable exception of being able to adjust the number of lines per page. That's not as bad as it might seem, since it's probably safer and easier to do formatting in the BASIC program than to use the special printer controls. That way, one can make the necessary compensations so the output can be directed either to screen or to printer. I've not yet been able to make lower case letters LIST properly, however.

At the Personal Computing 79 show in Philadelphia (Oct 4-7), I saw a new dot-matrix by Base-2, Inc., (P.O. Box 3548, Fullerton, CA, 92634) that looks like a winner. In addition to RS-232, 20 ma, and Centronics I/O, it will also work with the IEEE 488 bus. That means you wouldn't need any special software for use with the PET ... you could use the built-in CMD and PRINT# functions on the IEEE port. By varying the print width (by sending a special control character), the printer will accommodate anywhere from 72 to 132 characters per line on 9 1/2 inch paper. The good news is that it is priced at \$499, or with tractor feed for \$599. The bad news is that cables for connection to PET are not yet available ... but that's a problem that can be solved!

In addition to the Skyles keyboards and memory expansion, you should take note of products from two other firms.

Century Research and Marketing (4815 West 77th St., Minneapolis, MN 55435) makes a nice auxiliary keyboard that plugs into the PET and can either be built into the PET or mounted in a separate plastic case which the company also sells. In addition to duplicating the original PET keys, this unit also provides several duplicate keys around the numeric keypad ... you get an extra RETURN, SHIFT, SPACE, and ? key. It's a handy addition. I believe the keyboard sells for \$109.95, and the case for about \$20. Write and check before you order.

For those who want more memory but don't want to modify their PET's, International Technical Systems (P.O. Box 264, Woodbridge, VA 22194) sells an attractive cabinet containing an external memory unit that simply plugs into a wall socket for power (it has its own built-in supply rather than stealing power from the PET), and plugs into the PET memory port. For \$297, you get an extra 8K bytes. A second model, which can provide up to 32K additional, will be available soon, but price has not yet been announced. The expandable version will also be available with an extender so that other products, such as certain disk units,

may also be attached to the memory connector.

In the Decimal to Binary routine on page 12, there's an example of a technique that can be very useful. While some languages provide an IF...THEN...ELSE statement, PET BASIC only supports the IF...THEN part; however, there's a trick available. If you use the colon (:) to put several statements on one line, and the first statement is an IF...THEN, then the rest of the statements on that line will execute only if the IF condition is met. If the last of those statements is a GOTO, you can skip the next few lines if the condition is met, but execute them if the condition is not met (since control will not reach the GOTO). Look at lines 40 to 55 in the routine to see the example.

The article on "Tape Decay" omitted one important warning ... always suspect the cassette unit first. The heads should be both cleaned (Q-tip and rubbing alcohol or commercial head cleaner) and demagnetized (demagnetizers available from Radio Shack, Lafayette, etc.) whenever you begin to have tape problems. I had my friend, Mike Johnson, all set to realign his recorder, until I discovered that the problem was dirty heads in mine!

C. L. Buchanan (5000 Shopton Drive, Camp Springs, MD 20031) has been doing some very detailed examination of the cassette routines in the NEW ROMS. Anyone else digging into the same ROM routines might want to share information with him.

## BETTER LIST

by Fran Turco

The LIST routine Commodore supplies with the PET was designed to list on the CRT. No provision was made for the eventual use of a printer. We connected a DEC Writer II to our PET through a CμC ADA 1200 interface. Several problems surfaced immediately.

- 1) The graphics that would normally appear on the CRT yield strange results on the printer.
- 2) The LIST routine has no check for page being full with subsequent page eject; i.e., there is no Top-Of-Form command.
- 3) There is no header.
- 4) The line numbers are left-justified. Consequently, the text of your program does not line up when listed.

Attached you will find a listing for a program we call 'BETTER LIST'. It addresses the described deficiencies as follows:

- 1) The code for the graphic symbol is listed between braces { }. (In our documentation we include a REM statement explaining the code. See line # 63924.)

- 2) 'BETTER LIST' breaks the text into pages and provides a TOF command to the printer.
- 3) A header is printed at the top of each page. It includes the date and an optional title (supplied by the user) and automatically numbers the page.
- 4) The line number is right justified. Consequently, even if your line numbers go from 2 to 3 to 4 digits, your text remains lined up. This is especially nice for indented FOR...NEXT loops such as lines 63946 thru 63966 of 'BETTER LIST'.

A few words of description about 'BETTER LIST':

- Lines 63903 - 63917 write the table of token bytes into memory for later use to disinterpret the program to be listed.
- Lines 63918 - 63923 initialize variables.
- Lines 63924 - 63942 provide the operator interaction with 'BETTER LIST'.
- Lines 63943 - 63966 are the main program instructions that disinterpret memory and list the findings.
- Lines 63968 - 63978 are the header subroutine.
- Lines 63979 - 63987 are the line number calculation subroutine.
- Lines 63988 - 63995 provide the key words that will be printed for the disinterpreted token bytes.
- Lines 63996 - 63998 are the closing out routine.

Operation is as follows:

- 1) Load the program you wish to list.
- 2) Append 'BETTER LIST' to it. (This may be a problem for PET owners with a minimal system. We use the Tool Kit APPEND command. Several MERGE programs are available.)
- 3) Type RUN 63999. Answer questions as they are presented.

We are working on a version of 'BETTER LIST' that will allow operation on a PET without merging programs. However, considering the frailties of man, this version may never make it. I hope this version will prove useful for final documentation purposes. We still use the normal LIST command during the program development and debug phases and then make a "pretty" copy with 'BETTER LIST'.



# BETTER LIST

TABLE

INIT

INTERACTION

OPERATOR

WA

```

63896 REM 'BETTER LIST' PROGRAM BASED ON DISINTERPRETER BY WARREN SWAN.
63897 REM REFERENCE: PET USER NOTES VOL 1 ISSUE 3 PAGE 5
63898 REM
63899 REM SUBMITTED BY FRAN TURCO
63900 REM 800 FOLLIN LANE
63901 REM VIENNA, VA 22180
63902 REM
63903 DIM C$(255)
63904 C$(0)=CHR$(13):REM DEFINE CR
63905 FOR I=1 TO 31:REM DEFINE UNUSED KEYWORDS
63906 : C$(I)=STR$(I)
63907 NEXT I
63908 FOR I=32 TO 127:REM DEFINE THE CHARACTER SET
63909 : C$(I)=CHR$(I)
63910 NEXT I
63911 FOR I=128 TO 202:REM DEFINE BASIC VERBS
63912 : READ C$(I)
63913 NEXT I
63914 FOR I=203 TO 254:REM DEFINE UNUSED KEYWORDS
63915 : C$(I)=STR$(I)
63916 NEXT I
63917 C$(255)="'PI'":REM DEFINE PI
63918 U=32760:REM ESTABLISH UPPER LIMIT FOR DISINTERPRETER MEMORY RANGE
63919 REM REPLACE 32760 ABOVE WITH 8184 FOR 8K PET
63920 L=1024:REM ESTABLISH LOWER LIMIT FOR DISINTERPRETER MEMORY RANGE
63921 SP$=""
63922 PN=0:REM INITIALIZE PAGE NUMBER COUNTER
63923 FLAG=0:REM SUPPRESS PRINTING
63924 REM 147=CLEAR SYMBOL; 209=DOT SYMBOL
63925 PRINT "<147>":REM CLEAR SCREEN
63926 PRINT "SELECT OUTPUT DEVICE:"
63927 PRINT " {209}TYPE 3 FOR CRT"
63928 PRINT " {209}TYPE 5 FOR PRINTER"
63929 INPUT D
63930 OPEN 5,D:REM OPEN OUTPUT FILE
63931 PRINT
63932 PRINT "ENTER THE LOWER & UPPER LINE NUMBERS"
63933 PRINT "OF THE PROGRAM YOU WANT LISTED"
63934 PRINT "FOR EXAMPLE: 0,63800 LISTS ALL"
63935 INPUT N1,N2
63936 PRINT:PRINT "ENTER TODAY'S DATE";
63937 INPUT D$
63938 PRINT:PRINT "DO YOU WANT A HEADING";
63939 INPUT Y$
63940 IF LEFT$(Y$,1)="N" THEN S=50:GOTO 63943
63941 PRINT:PRINT "ENTER DESIRED HEADING"
63942 INPUT H$
63943 I=L:REM SET UP STARTING POINT FOR DISINTERPRETING
63944 GOSUB 63968:REM PRINT HEADER
63945 GOSUB 63980:REM CALCULATE AND PRINT LINE NUMBER
63946 FOR I=L+5 TO U
63947 : P=PEEK(I):REM EXTRACT BYTE FROM MEMORY
63948 : IF QF=1 AND P<>34 THEN 63952:REM SKIP IF QUOTE WASN'T CLOSED
63949 : IF QF=1 AND P=34 THEN QF=0:GOTO 63957
63950 : IF P<>34 THEN 63957
63951 : QF=1:REM SET THE QUOTE FLAG

```

# BETTER LIST

```

MAIN
63952 : IF P=0 THEN 63959:REM CHECK FOR END OF LINE BEFORE CLOSING QUOTE
63953 : IF P>31 AND P<95 THEN 63957:REM IF AN ASCII CHAR, SKIP NEXT LINE
63954 : IF D=3 THEN PRINT#5,"(";MID$(STR$(P),2);")";REM IDENTIFY GRAPHICS
63955 : IF D=5 THEN PRINT#5,CHR$(123);MID$(STR$(P),2);CHR$(125);
63956 : GOTO 63966
63957 : IF FL=1 THEN PRINT#5,C$(P);REM PRINT THE DISINTERPRETED BYTE
63958 : IF P<>0 THEN 63966:REM IF NOT END-OF-LINE, GET NEXT BYTE
63959 : OF=0:REM TURN OFF THE QUOTE FLAG
63960 : IF FL=1 THEN CTR=CTR+1:PRINT#5:REM INCR LINE CTR & DUMP LPT BUFFER
63961 : IF PEEK(I+1)=0 AND PEEK(I+2)=0 THEN 63996:REM LIST IS COMPLETE
63962 : IF CTR<60 THEN 63965:REM IF NOT AT BOT OF PAGE , START NEXT LINE
63963 : PRINT#5,CHR$(12):REM PRINT TOP OF FORM
63964 : GOSUB 63969:REM PRINT HEADING
63965 : GOSUB 63980:REM CALCULATE AND PRINT THE LINE NUMBER
63966 NEXT I
63967 GOTO 63996
63968 REM HEADER SUBR
63969 : CTR=4:FN=FN+1:REM INITIALIZE L.N. COUNTER, INCR P.N. COUNTER
63970 : IF LEFT$(Y$,1)="N" THEN S=50:GOTO 63975:REM IF NO HEADING, PRINT DAT
63971 : S=INT(((56-LEN(H$))/2)+.5):REM CALCULATE SPACES TO CENTER HEADING
63972 : FOR K=1 TO S:PRINT#5," ";NEXT K
63973 : PRINT#5,H$:REM PRINT HEADING
63974 : S=INT((S/2)+.5)
63975 : FOR K=1 TO S:PRINT#5," ";NEXT K
63976 : PRINT#5,D$;" PAGE";LEFT$(SP$, (3-LEN(MID$(STR$(FN),2)))):FN
63977 : PRINT#5:PRINT#5
63978 RETURN
63979 REM LINE NUMBER CALCULATION SUBROUTINE
63980 : I=I+4:REM SKIP THE 2 POINTER BYTES, MOVE TO LINE-NUMBER MSB
63981 : LV=PEEK(I-1):REM FETCH THE LSB
63982 : HV=PEEK(I):REM FETCH THE MSB
63983 : LN=HV*256+LV:REM CALCULATE THE LINE NUMBER IN DECIMAL,
63984 : IF LN>=N1 THEN FLAG=1:REM ENABLE PRINTING
63985 : IF LN>=N2 THEN 63996:REM PARTIAL LIST IS COMPLETE
63986 : IF FL=1 THEN PRINT#5,LEFT$(SP$, (6-LEN(MID$(STR$(LN),2)))):LN;" ";
63987 RETURN
63988 DATA END,FOR,NEXT,DATA,INPUT#,INPUT,DIM,READ,LET
63989 DATA GOTO,RUN,IF,RESTORE,GOSUB,RETURN,REM,STOP
63990 DATA ON,WAIT,LOAD,SAVE,VERIFY,DEF,POKE,PRINT#
63991 DATA PRINT,CONT,LIST,CLR,CMD,SYS,OPEN,CLOSE,GET
63992 DATA NEW,TAB(,TO,FN,SPC(,THEN,NOT,STEP,+,-,*,/,^
63993 DATA AND,OR,>,<,<,SGN,INT,ABS,USR,FRE,FOS,SQR
63994 DATA RND,LOG,EXP,COS,SIN,TAN,ATN,PEEK,LEN,STR#
63995 DATA VAL,ASC,CHR#,LEFT#,RIGHT#,MID#
63996 PRINT#5,CHR$(12),CHR$(12):REM ADVANCE PAPER OUT OF LPT
63997 CLOSE#5:REM CLOSE OUTPUT FILE
63998 END
63999 GOTO 63903

```

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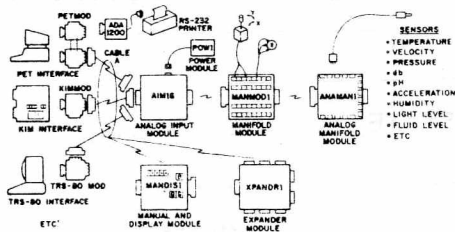
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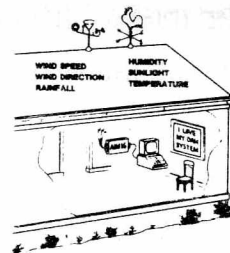
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